	A	B
1	Source	Page
2	Commentor77	7
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4	Commentor77	7 and 8
5		7 and 8

	A	B
6	Commentor77	8
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8	Commentor77	8
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10	Commentor77	9
11	Commentor77	9, 10, and 11
12	Commentor77	10

	A	B
13		10
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15	Commentor77	10
16	Commentor77	10
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18	Commentor77	10 and 11

	A	B
19	Commentor77	11
20	Commentor77	11
21	Commentor77	11

	A	B
22	Commentor77	11 and 12
23	Commentor77	12
24	Commentor77	12

	A	B
25	Commentor77	13
26	Commentor77	13
27	Commentor77	13

	C
1	Comment
2	The Oregon Board of Forestry has responsibility to provide “practicable” measures and an effective nonpoint source control program for private forests in Oregon. One of the most important factors in an effective program is that the landowners and operators believe in and support the program (Sugden et al. 2012).
3	Private landowners, foresters, and loggers support the OFPA, and application of the rules is high (Robben and Dent 2002).
4	The IMST Forestry Report also concludes that “[t]here is not a scientifically sound basis for managing riparian buffers based on the presence or absence of game fish.” While this may or may not be true (See discussion below of Janisch 2012), it is a logical policy decision by the Oregon Board of Forestry to focus on fish-bearing stream that provide a greater return on environmental protection investments for salmon and water quality.
5	see above

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6	The RipStream Study, available at http://goo.gl/2rbDTo, represents new science since the Agencies set conditions for the forestry nonpoint source control program in 1998. This study is cited as supporting a “not satisfied” finding for the conditions of forest riparian areas under the OFPA. We believe that the Agencies have not carefully evaluated the findings from RipStream, focusing on small short-term increases in stream temperature. A closer examination of the results from RipStream would conclude that: Maximum water temperatures in streams adjacent to private lands harvested under today’s OFPA rules experienced a wide range of responses including small increases and decreases. These changes were an order of magnitude smaller than the changes observed with pre-OFPA rule harvests (Groom et al. 2011a; Groom et al. 2011b). The small increases observed on average for maximum stream temperatures following harvesting on private forestland harvests did not result in streams failing biologically-set water-quality standards (Groom et al. in preparation). Three of the private forest sites in the RipStream Study experienced the greatest increases in water temperatures and these conditions could be address through minor modifications to the rules or guidelines rather than sweeping changes. Preliminary data results from RipStream shows that maximum water temperatures recover downstream (Presentation to the RipStream External Advisory Committee). Preliminary analysis finds that shade and maximum water temperatures recover rapidly over time, with a 5 year recovery period, and the most rapid recovery for sites experiencing the largest changes. Annual variation in weather and disturbances such as beaver, windthrow, fire, landslides, and floods can cause substantially greater changes in maximum water temperature than the responses seen following forest harvests (Ice and Schoenholtz 2003). In many cases these disturbances and variations can stimulate the productivity of trout and salmon populations. The Board of Forestry is seriously assessing what changes if any are needed in the OFPA rules. While we believe any changes to the OFPA rules should be minor, the Oregon BOF will go through a thoughtful and public assessment of these rules based on the best available science
7	see above
8	see above
9	see above
10	These three studies represent the first paired forest watershed studies to assess the impacts of contemporary forest practices since the original 1959-73 Alsea Watershed Study (Stednick 2008).
11	The following summary of the observed sediment and temperature responses from WRC projects is from a summary paper by Ice (2013).
12	Contained in the Ice (2013) summary - Compared to water quality impacts measured in benchmark studies at the Alsea Watersheds in coastal Oregon and H.J. Andrews Experimental Forest in the Oregon Cascades, impacts following the WRC harvests are small (Beschta and Jackson 2008; http://watershedsresearch.org/assets/reports/WRC_Skaugset_Hinkle%20Sediment_2013_S3.pdf).

	C
13	see above
14	Contained in the Ice (2013) summary - Most of the increase is believed to have resulted from increased stream power due to elevated discharge, as no overt sediment delivery was observed. This is consistent with findings from other forest watershed studies across the US (NCASI 2012).
15	Contained in the Ice (2013) summary - Alto Watershed Project in Texas, sediment losses for contemporary forest practices with BMPs were 80 to 90% less than historic levels and were within the range of natural disturbance events (McBroom et al. 2008).
16	Contained in the Ice (2013) summary - This story is repeated for stream temperature changes. Increases in temperature for harvests near fish-bearing streams were small compared to impacts we would have expected without FPA rules. In the Alsea Watershed Study Revisited we can look at water quality responses in the same watershed to compare effects with and without the Oregon FPA rules (Ice et al. 2011; http://watershedsresearch.org/assets/reports/WRC_Light_Alsea%20stream%20temps_2013_S2.pdf). The maximum temperature increase was about 1°F (7 day moving average of maximum daily water temperature) compared to as much as 18 to 25°F increases observed in the original study. There was also little temperature response in the harvests near fish-bearing reaches of Hinkle Creek.
17	see above
18	Contained in the Ice (2013) summary - There were also some surprises. The consensus among forest hydrologists was that harvests along non-fish-bearing reaches in Hinkle Creek would produce large stream temperature increases, perhaps approaching those observed in the original Alsea Watershed Study. FPA rules do not require shade retention along these types of streams. Instead, water temperature responses were small and variable (Kibler 2007). In some cases maximum streamwater temperatures actually decreased following logging. The small responses were a result of shade produced by low-hanging shrubs and slash in the riparian area. The decrease in water temperature was probably a result of increased streamflow from reduced evapotranspiration following harvesting. The headwater reach in the treatment watershed in the Alsea Watershed Study Revisited also showed little change in temperature, as waters remained very cold.

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19	Perhaps the muted and variable temperature responses that have been observed in the headwater type N streams should not be a surprise. Jackson et al. 2001 conducted a study comparing the effect of timber harvesting on headwater streams in Washington where buffered and no-buffer riparian areas were compared. They found that "[o]f the seven clearcut streams, three exhibited no statistically significant difference in stream temperature, one became cooler (-1.1°C), one became slightly warmer (+0.8°C), and the remaining two streams became both cooler and warmer depending on location in the stream." Jackson et al. concluded that slash from the harvest provided cover over these channels to create this muted temperature response. By comparison, two of the buffered streams became warmer and one became slightly cooler. The buffer trees may have served as barriers to keep slash out of the stream but also creating potentially more stream exposure to solar radiation.
20	More recently, a study of headwater streams in Washington (Janisch et al. 2012) found a similar mixed and muted stream temperature response to alternative headwater treatments. Temperature responses were highly variable within treatments and, contrary to our expectations, stream temperature increases were small and did not follow expected trends among the treatment types. We conducted further analyses in an attempt to identify variables controlling the magnitude of post-harvest treatment responses. These analyses showed that the amount of canopy cover retained in the riparian buffer was not a strong explanatory variable. Instead, spatially intermittent streams with short surface-flowing extent above the monitoring station and usually characterized by coarse-textured streambed sediment tended to be thermally unresponsive. In contrast, streams with longer surface-flowing extent above the monitoring station and streams with substantial stream-adjacent wetlands, both of which were usually characterized by fine-textured streambed sediment, were thermally responsive. Overall, the area of surface water exposed to the ambient environment seemed to best explain our aggregate results. Results from our study suggest that very small headwater streams may be fundamentally different than many larger streams because factors other than shade from the overstory tree canopy can have sufficient influence on stream energy budgets to strongly moderate stream temperatures even following complete removal of the overstory canopy. The underlined text represents a key new finding that conflicts with the conclusion in Sufficiency Analysis mentioned above.
21	see above

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22	Another important opportunity is to put these observed water quality responses into context with the scale of annual and between-stream variability observed in these watersheds. Ice (2013) notes that: The scale of changes in water quality that can be detected needs to be compared to natural variations between basins and years, to assess whether changes that are statistically significant are also ecologically significant. For example, we looked at how suspended sediment loads varied for the three Alsea Watersheds during the 1959-1965 pre-treatment period. During this time all three watersheds were described as having old-growth forest stands. For this seven year period (before management activities) the annual suspended sediment loads varied around the median load by -52 to +830% for the control watershed, and minus 43-65% to + 267-560% for the two treated watersheds. The average suspended sediment loads (adjusted for watershed size) between the three watersheds during this period varied by ±45%. By using the paired watershed approach scientists were able to detect the 100 to 400% increases in the original study and we should be able to detect the smaller changes in our contemporary studies, but is it affecting aquatic communities that have developed in this type of variability? Maximum temperatures experienced annually during this same period varied by 1.7 to 2.8°C for the three watersheds and the difference in maximum annual water temperature observed between watersheds was 0.6°C.
23	Research by the WRC also addresses transport of water quality impacts downstream and recovery over time (Ice 2013). Changes in water quality resulting from forest management can diminish rapidly downstream and over time. All water parameters are non-conservative, meaning that they do not transport downstream without reductions. Suspended sediment particles can be trapped in long-term storage or dissolve. Watershed scientists use the term “delivery ratio” to reflect the change in sediment amount delivered downslope or downstream from an erosion site. Delivery ratios are always less than one, often reflecting a large reduction in sediment delivered. Forest streams often have features, such as deep gravel deposits, that allow for mixing and muting of temperature increases. Water temperature is constantly interacting with its environment to gain or lose heat. The Hinkle Creek study showed that temperature increases were not propagating far downstream. Nutrients may be taken up by aquatic or riparian plants. Forests also recover over time and provide the cover and forest floor conditions that provide high quality water resources. Even for severe disturbances such as the original Alsea Watershed Study, temperatures recovered to within the range of values observed in the 1959-1965 pre-treatment period (Hale 2007).
24	see above

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25	First observations from the Trask Watershed Study suggest that temperature increases following harvesting along some of these type N streams are going to be larger than those observed at Hinkle Creek and the Alsea Watershed Study Revisited (Maryanne Reiter, personal communication, February 18, 2014), but temperature impacts are not transporting downstream. At Mica Creek, Idaho, an increase in streamwater temperature of 3.6°C was observed for an upper reach of a clearcut (non-fish reach without a buffer) but there was no significant change in the maxima observed at the downstream fish-bearing reach (Gravelle and Link 2007).
26	The WRC study at Hinkle Creek appears to highlight the role of smaller debris to provide shade for type-N streams and the critical role of woody debris and rocks for cover in small fish-bearing reaches.
27	Perhaps most importantly, the WRC studies are measuring the fish and macroinvertebrate response to contemporary forest practices, and the results are available at http://watershedsresearch.org. The findings so far indicate that timber harvesting on headwater type-N and along small and medium type F streams is not degrading fish populations.

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1	Citation
2	Sugden, B.D., R. Ethridge, G. Mathieus, P.E.W. Heffernan, G. Frank, and G. Sanders. 2012. Montana's forestry Best Management Practices Program: 20 years of continuous improvement. Journal of Forestry 110(6):328-336.
3	Robben, J. and L. Dent. 2002. Oregon Department of Forestry Best Management Practice compliance monitoring project: Final Report. Oregon Department of Forestry, Forest Practices Monitoring Program Technical Report 15. Available at: http://www.oregon.gov/odf/privateforests/docs/bmpfinaltr15.pdf (Access 2/20/2014).
4	Independent Multidisciplinary Science Team (IMST). 1999. Recovery of wild salmonids in Western Oregon forests: Oregon Forest Practices Act rules and the measures in the Oregon Plan for Salmon and Watersheds. Technical Report 1999-1 to the Oregon Plan for Salmon and Watersheds, Governor's Natural Resources Office, Salem, Oregon. Available at: http://www.fsl.orst.edu/imst/reports/1999-1.pdf (Accessed 2/20/2014).
5	Janisch, J.E., S.M. Woodzell, and W.J. Ehinger. 2012. Headwater stream temperatures: interpreting response after logging with and without riparian buffers, Washington, USA. Forest Ecology and Management 270:302-313.

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6	Groom, J.D., L. Dent, and L.J. Madsen. 2011a. Response of Western Oregon stream temperatures to contemporary forest management. Forest Ecology and Management 262(8):1618-1629.
7	Groom, J.D., L. Dent, and L.J. Madsen. 2011b. Stream temperature change detection for state and private forests in the Oregon Coast Range. Water Resources Research 47(1)
8	Groom, J.D. et al. (in preparation) Timber harvest and the assessment of Oregon's Biologically-Based Numeric Criteria in Coast Range streams.
9	Ice, G.G. and S.H. Schoenholtz. 2003. Understanding how extremes influence water quality: Experiences from forest watersheds. Hydrologic Science and Technology 19(1-4):403-420.
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12	Beschta, R.L., and Jackson, W.L. 2008. Forest practices and sediment production in the Alsea Watershed Study. 55-66 in Stednick, J. [Ed.]. Hydrological and Biological Responses to Forest Practices: The Alsea Watershed Study. New York: Springer Science+Business Media.

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13	http://watershedsresearch.org/assets/reports/WRC_Skaugset_Hinkle%20Sediment_2013_S3.pdf).
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16	Ice, G., Louch, J., Cook, D., Bousquet, T., Light, J., Hale, C., McDonnell, J., Bateman, D., Li, J., Gerth, B., Stednick, J., and Schoenholtz, S. 2011. The Alsea Watershed Study Revisited: A half century of new lessons. Paper presented at Society of American Foresters National Convention, Honolulu, HI.
17	http://watershedsresearch.org/assets/reports/WRC_Light_Alsea%20stream%20temps_2013_S2.pdf
18	Kibler, K.M. 2007. The Influence of Contemporary Forest Harvesting on Summer Stream Temperatures in Headwater Streams of Hinkle Creek, Oregon. MS thesis. Corvallis, OR: Oregon State University.

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19	Jackson, C. R., Sturm, C. A., & Ward, J. M. (2001). TIMBER HARVEST IMPACTS ON SMALL HEADWATER STREAM CHANNELS IN THE COAST RANGES OF WASHINGTON. J. Amer. Water Resour. Assoc. 37:1533-1550.
20	Janisch, J.E., S.M. Woodzell, and W.J. Ehinger. 2012. Headwater stream temperatures: interpreting response after logging with and without riparian buffers, Washington, USA. Forest Ecology and Management 270:302-313.
21	Independent Multidisciplinary Science Team (IMST). 1999. Recovery of wild salmonids in Western Oregon forests: Oregon Forest Practices Act rules and the measures in the Oregon Plan for Salmon and Watersheds. Technical Report 1999-1 to the Oregon Plan for Salmon and Watersheds, Governor's Natural Resources Office, Salem, Oregon. Available at: http://www.fsl.orst.edu/imst/reports/1999-1.pdf (Accessed 2/20/2014).

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22	Ice, G.G. 2013. Protecting forest water quality: Progress and management implications. Paper presented at Watershed Research Cooperative Policy Workshop. Salem, OR: Manuscript available from author on request.
23	Ice, G.G. 2013. Protecting forest water quality: Progress and management implications. Paper presented at Watershed Research Cooperative Policy Workshop. Salem, OR: Manuscript available from author on request.
24	Hale, V.C. 2007. A Physical and Chemical Characterization of Stream Water Draining Three Oregon Coast Range Catchments. MS thesis. Corvallis, OR: Oregon State University.

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25	Gravelle, J.A. and T.E. Link. 2007. Influence of timber harvesting on headwater peak stream temperatures in a Northern Idaho watershed. Forest Science 53(2):189-205.
26	They did not reference a citation, but this would be it if they did - Kibler, K. M., Skaugset, A., Ganio, L. M., & Huso, M. M. (2013). Effect of contemporary forest harvesting practices on headwater stream temperatures: Initial response of the Hinkle Creek catchment, Pacific Northwest, USA. Forest Ecology and Management, 310, 680-691.
27	http://watershedsresearch.org

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18	There is actually currently a published article by Kibler on this topic - Kibler, K. M., Skaugset, A., Ganio, L. M., & Huso, M. M. (2013). Effect of contemporary forest harvesting practices on headwater stream temperatures: Initial response of the Hinkle Creek catchment, Pacific Northwest, USA. Forest Ecology and Management, 310, 680-691.

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20	General comment - This OFIC comment does not contain a specific reference to the **"conclusion"** within the "Suffeiciency Analysis" which the Janisch et al. 2012 citation contradicted (see last sentence in the copied paragraph to the left). Recall that the OFIC comment on page 7/8 (listed above and reproduced below) indicated that they were going to address the IMST report conclusion that - ["The IMST Forestry Report also concludes that "[t]here is not a scientifically sound basis for managing riparian buffers based on the presence or absence of game fish." While this may or may not be true (See discussion below of Janisch 2012)it is a logical policy decision by the Oregon Board of Forestry to focus on fish-bearing stream that provide a greater return on environmental protection investments for salmon and water quality.] - I do not see the link
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26	Hinkle Creek study determined that it was unintended slash which provided shade (It was upto 2 meters on the surface of the stream). Slash has many detrimental ecological effects (many are described in detail at the end of the Kibler citation). Also slash is not a component of LWD. Also the deposition of slash on the stream is not allowed under current OFPA rules.
27	There are a lot of documents on this webpage - many of the documents were not relavant to this topic (i.e., methods development work by masters students - fish pit tag method development, etc). I recall that cuttrhroat trout were the target population using in the study, and they measured mass of the fish following harvest - Cuthroat trout are a very hardy fish and the increase weight would be expected because the elevated light, nutrients, and water temperature resulting from stream/riparian disturbance results in greater primary productivity (i.e., more bugs to eat for the cutthroat and they can survive the changed stream conditions). There are a lot of other issues with this comment.